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AREAS FOR RESEARCH IN LIBRARY SCIENCE.
(Development of library science. 6).

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The findings of research enrich the universe of ideas. Observational research records facts of experience; and it essentially depends upon the mental act of perception. Empirical research formulates the generalised laws on the basis of observed facts; and it essentially depends on the intellectual act of induction. Fundamental laws are not the results of research; they are got by direct apprehension through intuition. Pure research is *a priori* research arriving at deduced laws on the basis of fundamental laws. Pure research is not directed towards the solution of any utilitarian problems. Applied research is *a priori* research for an immediate distinct utility. Developmental research makes finer adjustments and improvements in the results of pure and applied research, or of observational and empirical research. After the formulation of the Fundamental Laws known as the Five Laws of Library Science, Library Science and its branches entered the Spiral of Scientific Method. In addition, some of these branches have their own fundamental laws called Canons and Principles for distinction. Library Science and its branches are now fit fields for all the five kinds of research. After clearing the ground in this way, some indication is given of what has been already achieved by research and what is still requiring research in the different branches of Library Science — such as Classification, Cataloguing, Book Selection, Reference Service, Circulation, Organisation, and Administration — falling entirely within the sphere of the library profession. A similar treatment is also given to the subjects — such as development and structure of the universe of subjects, language and style of work, presentation of the text of

a book and of an article in a periodical, physique of the book, methods of reading and study, library housing, audit of the efficiency of library service, and absolute syntax — which are to be pursued by the library profession jointly with the specialists in the respective subjects.

0 INTRODUCTION

01 Purpose of Research

Research is critical and exhaustive investigation to discover new facts, to interpret them in the light of known ideas — laws and theories — , to revise the current laws and theories in the light of newly discovered facts, and to apply the conclusions to some practical purpose. The universe of ideas is being constantly enriched by research. The findings of research are deposited in the internal memories of individuals, and also in the externalised memory of society — which books, periodicals, and other documents are.

02 Observation and Experiment

Research can begin at one end with observation and/or experiment. Observation is the act of taking note of facts and depositing them in the memory either directly or after being correlated with already known facts; observation often involves the measurement of some quality or quantity. Experiment is the act of observation coupled with the manipulation of the context and the conditions of observation; it is often done in order to discover some unknown principle or relation among facts, or to test and illustrate an already known principle. The distinctive mental process involved in observation and experiment is perception. It is essentially the primary senses that are brought into play in perception. The primary senses may be unaided or be aided by instruments. Experiment, observation, survey, and other similar acts may be denoted for convenience by the term 'Observational Research'. This forms one level of research.

03 Empirical Research

Research can take over the results of observation, sort them out, and induct from them — with statistical methods including normal equations and correlation — certain generalised relation between facts. These are called Empirical Laws. The distinctive mental process involved in arriving at Empirical Laws is induction. It is essentially the intellect that is brought into play in induction. This may be denoted by the term 'Empirical Research'. It is really a matter-of-fact research. This may be regarded as another level of research.

04 PRAGMATIC RESEARCH

Both Observational Research and Empirical Research may be denoted by the generic term 'Pragmatic Research'.

05 FUNDAMENTAL LAWS

Apart from Empirical Laws, which are products of the intellect, it is also possible to have fundamental laws apprehended without the mediation of intellect or perception. It is essentially the intuition that is brought into play in immediate apprehension. Intuition apprehends the thing-in-itself without any conscious or recognisable mediation by intellect or perception. Hawthorn speaks of it as, "Sagacity and a nameless something more — let us call it intuition". Bergson brought this term into use to denote intellect-free, perception-free apprehension of the integral entirety of facts and relations between them. In Sanskrit, this is called 'Seeing' and one with abundant intuition is called 'Seer'. Sometimes this is also referred to as "divine or transcendental apprehension". Transcendental apprehension of fundamental laws through intuition should not be taken to be research; it is beyond research. It is the ultimate starting point for deep *a priori* research.

06 A PRIORI RESEARCH

Research can start from the fundamental laws; or it can take over the empirical laws formulated by empirical research and its follow-up and deduce from them, with the help of deductive logic and general semantics, many possible less general laws and even right upto concrete facts and the correlation between them. Some of these might not at all have been noticed earlier. The distinctive process involved in this is deduction. It is essentially the intellect that is brought into play in deduction. This may be denoted by the term '*A priori* Research'. It moves from assumed cause to its effect. It consists of two levels — Pure Research and Applied Research.

061 PURE RESEARCH

A priori research —and occasionally even pragmatic research — may be pursued unbiased by any possible use of its results. It may not be directed towards the solution of any practical problems of any known, immediate, or ultimate utility. This is denoted by the term 'Pure Research'. We can have pure research in any subject. Pure Mathematics is the field *par excellence* for pure research. For, as Bertrand Russell observed, "Mathematical research is pursued without even caring to know whether it has or does not have any correlate in the phenomenal world. A pure mathematician pursues his research without even caring to know whether his results are meaningful". Pure research usually estab-

lishes a variety of tools and models. And when factual experience grows, society may find some of those models to be meaningful to some utilitarian purpose. As far back as the fourth millennium before Christ, the Chaldeans had provided a model to represent the movement of the heavenly bodies. It puts the earth in the centre and makes the planets, the sun, and the stars move in circles. Certain observed motions did not fit into this model. To fit them in, the model was slightly changed by the Greek by the introduction of epicycles. The observations of Tycho Brahe (1546) called for many inconvenient modifications to the Greek model to have the observations fitted in. Another model was set up and improved upon by a series of astronomers — Copernicus, Kepler, and Newton. Some later observations did not fit into these modified models. Then Einstein provided a still another model. Still later came the model of Hoyle and Narlikar to fit into it certain other newly observed facts which could not be fitted into the Einstein model. The utility of pure research may be found only years later — sometimes, even centuries later. That is why the epithet 'Pure' is used in the term 'Pure Research'. Pure research and indeed research of any kind is often decried by many. But they would not do so, if they knew the following indictment by the famous scientist Henri Poincare "The men most dissatisfied of theory get from it, without supporting it, their daily bread; deprived of this food, progress would quickly cease and we should soon congeal into immobility" (9).

062 APPLIED RESEARCH

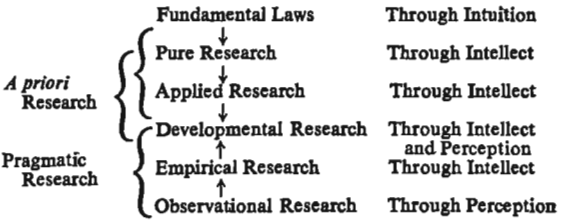
Applied research is pursued for some end outside its own domain, either for an immediate distinct utility or as an aid to the development of some other subject. Applied Mathematics, Applied Mechanics, Applied Chemistry, Applied Psychology and Applied Sociology are examples. Applied Research should be distinguished from Pure Research.

063 DEVELOPMENTAL RESEARCH

Developmental Research takes over either from *a priori* or from pragmatic research, and makes finer adjustments and improvements in the results already obtained to facilitate the achievement of immediate utility. The need for this is now recognised in almost all industries. Many industrial houses are now having wings for developmental research.

07 SCHEMATIC DIAGRAM

The following schematic diagram represents the relation of the various kinds of research to one another and to the fundamental laws which are beyond research.



071 BLENDING OF THE KINDS OF RESEARCH

The intellectual analysis of research into various kinds and their schematic representation of the results of analysis have been done only as a help to the understanding of the nature of research work. Though intellectually separable, the different kinds of research are not separated in actual practice. On the contrary, they are blended at various stages and in different combinations. This is a matter of judgement in each situation.

08 ROLE OF INTUITION IN RESEARCH

While research is essentially intellectual, it is occasionally lighted up by a dash of intuition in some researcher or other. The intuition coming into play is so slight and so fleeting that it does not reveal any fundamental laws. Intuition may also reveal the value of something seen or done, which escapes apprehension by intellect alone. Here too the intuition coming into play is so slight and so fleeting that it does not reveal fundamental laws. Perhaps, its role in research may be described as analogous to the role of trace element in nutrition. Or to change the analogy, it is something like the water flowing in a river being occasionally added to by a feeble underground spring. In spite of such a feeble play of intuition, research is only intellectual. On the other hand, a large dose of intuition alone can flood-light the phenomenal world down to the near-seminal level and reveal fundamental laws. The duration of this large dose of intuition may not be long. Some perceptual and intellectual experiences of the intuitive person — whether they are acquired by himself or are found in his apperceptive-mass injected into his mind by his social environment — may or may not have anything to do in the release of intuition. Except for the "Seers", continuously steeped in mystic experience, a person who gets a flash of a strong dose of intuition for a moment and "sees" some fundamental laws often becomes thereafter an essentially intellectual worker. It was intuition that

helped Newton to "see" the fundamental laws of gravitation and of motion; but it was the intellect in him that led him to deduce from them the theorems on Planetary Orbits. This was pure research. Again, the laborious, prolonged, observational, and pragmatic research of Darwin was a persistent act of intellect. But his "Seeing" the fundamental laws of Phylogeny was an act of a large dose of intuition functioning for a short while. The follow-up of Darwin's Laws by Geneticists is pure or applied research; the further follow-up by Breeders is developmental research. Ramanujan "saw" many mathematical results through the play of intensive intuition for a while. But all the rest of his time, he followed up what he "Saw", by laborious pure research and this was only an act of intellect. He remarked about this to one of our common friends when the latter reported to him about everybody calling him a genius. Ramanujan replied in effect, "Look at the elbow of this genius". My friend asked "Why is the skin so hard and black?" Ramanujan replied, "I have to do my work by writing out on slate all the time. I use my elbow every now and then to wipe out the slate." Intuition and intellect may function in the same person. But research is the result of intellectual work and fundamental laws are the results of intuitive "Seeing". Sometimes, the different levels of research in a subject are pursued by different persons. Here is an example. From 1560–1597, observational research on the motion of heavenly bodies was made by Tycho Brahe of Denmark. The results of his observations are now available in fifteen volumes printed in 1930. Towards the end of the life of Brahe, Johannes Kepler of Germany came into intimate contact with him. Taking over Brahe's results of observational research, Kepler did a considerable empirical research and got in 1609 some empirical laws concerning the elliptical orbits of planets. This is one line of approach to the problem of planetary orbits. The approach from the opposite direction made by Newton, later in the seventeenth century, has been described earlier in this Section.

1 LIBRARY SCIENCE

11 Pragmatic Research

In the field of library work, observational research has been in vogue from the very beginning. For a long time, the developmental research, needed to bring the results of observational research to beneficial use, depended largely on the rule of thumb and trial and error method. Later on, the dependence on this method came to be reduced progressively by the formulation of inductive laws by empirical research.

12 FUNDAMENTAL LAWS

In our own days, library work is being based on Library Science. With the formulation of the Five Laws of Library Science in 1928 and their publication in 1931, Library Science took shape and research in library work entered the Spiral of Scientific Method (41). Intuition had done its work in the formulation of the Five Laws in a very short period and left. It took nearly two years for the intellect to make inferences from the Five Laws, which would explain then existing library practices. Even today — 36 years later—the intellect has to work on the Five Laws and get more inferences to suit the present-day social concepts influencing library service. In some of its branches, Canons peculiar to each branch have been formulated to reinforce the help of the Five Laws of Library Science, in order to minimise the need for going to the Five Laws themselves as the starting point on every occasion. In certain sub-branches, some Principels have been formulated to reinforce the help of the Canons. The Five Laws of Library Science, the Canons, and the Principles should together be taken as the Fundamental Laws forming the basis of *a priori* research. The Wall-Picture Principle was hit upon by intuition in a moment; and the intellect had to put in endless labour in applied and developmental research to exploit its possibilities.

13 A PRIORI RESEARCH

The formulation of the Fundamental Laws has made *a priori* research possible in Library Science as a whole and in its several branches. Illustrations of Pure Research and Applied Research, based on the Five Laws of Library Science, will be found in most of my books dealing with the diverse branches of Library Science. Illustrations of Developmental Research too will be found in some of my books and to a considerable extent in the quarterly *Library science with a slant to documentation* (1964–) sponsored jointly by the Sarada Ranganathan Endowment for Library Science and the Documentation Research and Training Centre, Bangalore.

14 FACTORS COMPELLING RESEARCH IN LIBRARY SCIENCE

140 FIVE FACTORS

The following are the five newly emerging major factors compelling research in library science in order to make library service economical and socially beneficial:

1 Social pressure leading to large numbers in readers;

2 Publication pressure leading to large numbers in books and periodicals;

3 Population pressure demanding pinpointed, exhaustive, and expeditious service to specialist readers;

4 Pressure of national and international economy leading to the service of micro subjects embodied in micro documents, forming only articles in periodicals or only chapters or even paragraphs in books; and

5 Pressure of standardisation and simplification in matters such as the size of books, receptacles for books, library housing, library fittings and furniture, presentation of the text of books and articles, and diverse library techniques.

141 SOCIAL PRESSURE

Today there is an unmistakable trend to make education compulsory. This means buying literacy at a heavy cost. It is but natural that the State should ensure that this costly commodity is not dissipated or lost. To prevent relapse to illiteracy, library service has to be made free to all — nay, the persuasion of every person to use the library should be one of the essential functions of a library. This increases the number of readers manifold; and the pressure of large numbers comes into play. Many improvements in library technique, organisation, administration, book production, library buildings, fittings and furniture, and other matters have become necessary. Provision for large numbers cannot be done by mere flair, as it may be possible in the case of small numbers. It has to be based on research. The present-day trend towards democratic form of government calls for the public being kept informed of many of the activities and policies of the Government of the State and of foreign Governments. The information should not be partisan. It should be well balanced Judgement should be left to the individuals. There is no neutral agency other than the library for this purpose. Therefore, each State is keen that every citizen should be persuaded to accept library service. The result of the increase in the number of readers and the consequent demand for research in library science are the same, as explained in connection with the result of universal literacy.

142 PUBLICATION PRESSURE

In former times, books were very few and they were largely for the learned few. But today the obligation to serve everybody with books carries with it the obligation to produce books on all conceivable subjects and in all possible standards and styles, in order to make it worthwhile and possible for anybody in the intellectual scale to accept library service. This increases manifold the number of books produced each year; and the pressure of large numbers comes into play. Selecting out of 200,000 books

produced each year, organising them, so as to make retrieval easy and expeditious, and fitting each subject and standard to the appropriate reader — all such matters call for improvement in techniques. The improvement of techniques calls for research in them. Similarly, the number of periodical publications and reference books has increased manifold. This factor also calls for research in library techniques.

143 POPULATION PRESSURE

The population of the world — and particularly the population of certain countries — has been mounting up all along. It has already reached the stage when there is disequilibrium between population and natural and near-natural commodities. Artificial commodities have to be processed out of the raw materials not directly consumable. This processing has to be based on research by those high up in the intellectual scale. Further, these persons have to specialise in narrow areas of subjects. In the past, the specialists were very few and the documents too were comparatively few and the readers were left to help themselves with whatever documents they needed. But today the number of specialists has increased manifold; with the result, specialists are to be drawn even from the second quartile in the intellectual scale. These persons cannot be expected to have the capacity to keep themselves fully informed of all the publications either as books or as articles in periodicals, bearing on their subject of specialisation. Therefore, it has now become a new duty of the libraries to serve the specialist readers with micro documents. This requires new techniques in classification, cataloguing, storage, reference service, and circulation. These new techniques have to be got and be continuously improved through research.

144 PRESSURE OF ECONOMY

The number of libraries serving the specialists is continuously on the increase. They are found in universities, research laboratories, government departments, industrial houses, and commercial houses. Several libraries serving the same kind of specialists are found scattered all over the world and even in one and the same country. It is surely wasteful for the staff of every one of these libraries to scan through all the periodicals and books, to select the micro documents needed by its specialist clientele, to classify them, to catalogue them, and to abstract them. National and international economy would indicate that all such treatment of micro documents should be done centrally. The ideal will be that it should be done centrally for the world as a whole; but till the political forces make such world organisations practicable, there should be central organisations at least in each country.

The depth classification needed for organising such a vast amount of micro documents and for abstracting them call for research of their own.

145 PRESSURE OF STANDARDISATION

Apart from the need for improvement of library techniques through research in order to meet the pressure of large numbers, a general appreciation of the value of standardisation and simplification is now spreading all through the world. Humanity has now realised the enormous amount of national and international economy that can be achieved through standardisation and simplification in the make-up and size of commodities. The ultimate commodity in library work is the reading material. In the case of the conventional publications, the size is being slowly standardised and reduced to as few as possible. The dimensions of the book-shelf are modulated to the dimensions of books. The heights of book-racks are modulated to the height of man. The heights of floors are modulated to the height of book-racks, and so on. There is a similar series of modulation for micro films and other small-size documents. There is yet another series of modulation for the library apparatus, beginning with the reader's ticket and issue tray. The sizes of the counter-table tops are modulated to this. The catalogue cards are standardised and the sizes of the catalogue cabinet are modulated to this. There is a series of other attempts at standardisation and simplification. These have not yet been completed. But simplifying and fixing these standards have to depend upon research. Standardisation and simplification are also possible in the intellectual work, in so far as they do not interfere in the slightest measure with the absolute freedom needed for creative work. There is now a tendency to establish a standard for the presentation of books and articles. There is also a world-wide tendency to establish homonym-free, synonym-free standard glossary of terms for each subject-field in each language of the world. To promote such standards, we have now the Standards Organisations in the different countries and the International Standards Organisation as the apex of them all. India, for example, has already established a few standards through the Documentation Section of the Indian Standards Institution. These standards are largely based upon research done by individual workers. The Standards Body should also have its own research staff to help this work.

15 RE-THINKING IN THE ELECTRONIC AGE

We have entered the electronic age after World War II. This is creating an unthought-of revolution in all human activities. It is calling for revolution in library work also. The items of

library work, which can take advantage of electronics, should be found out; similarly the items, which are out of bound for the use of electronics, should also be found out. Generally speaking, the presumption is that the items of library work needing judgement cannot take the service of electronics. Consideration of such points are now being either under-done or over-done depending on conservatism or on the sales-pressure of the electronic interests. There is a blind resistance to or a credulous acceptance of everything claimed for electronics. A considerable research is necessary to receive the services of electronics in the measure that is possible and practicable — practicable in the sense of the minimum size of turn-over needed for viability. The research necessary to guide re-thinking and fix the viable limits in the present electronic age is yet to be taken on hand in an adequate measure and with full circumspection.

16 Facilities for Research

161 Material Tools

Some of the material aids and instruments needed for research in any subject may be required for research in some of the branches of library science also. For example, a stop-watch will be useful in the man-minute analysis of the various jobs constituting the diverse items of routine involved in the administration of a library; and a calculating machine will be useful in the statistical study of several branches of library science.

162 Intellectual Tools

Since research in library science is mostly connected with large numbers, an important intellectual tool that should be used is the Theory of Probability and Statistical Calculus, including the Theory of Design of Experiment, Correlation, and the Determination of the Limits of Tolerance. For several years, there was a fierce controversy over the correct sequence of the ten main classes of the Decimal Classification. The wastefulness of that controversy was brought home and it ended as soon as the number of possible permutations of ten classes was shown to be 30,628,800 and that at least a few dozen of these permutations would be more or less equally helpful and that it would be impossible to choose one of them as the most helpful sequence. Again, the need for the cataloguing rules being made very detailed was brought home by a similar calculation with the aid of elementary algebra (44). Again a few libraries realised the colossal waste involved in keeping a detailed account of the overdue charges falling due from each person, giving a receipt to each person for the money collected, keeping an account book for this

purpose, the work of auditing, and many such items of routine. It was proved by a simple calculation that the cost of collecting ten paise per day per each overdue volume exceeded that amount. At least one library in India saw the ridiculousness of the blind Victorian accuracy in accounts; and it realised the poor probability for any commissions and omissions of any small amount in the calculation of overdues and accepted the recommendation of the use of the Conscience Box (18). Some branches of library science will require General Semantics as a helpful intellectual tool. Psychology of cogni ion and of emotion will be a useful intellectual tool in the investigation of problems in reference service and in public-relation work. A knowledge of the economics of public finance and tax pattern in particular is a necessary in the investigation of the financial problems of a library system. The method of sociological research will have to be used as an intellectual tool in estimating the overall efficiency of library service as a whole. This piece of pragmatic research was done in USA sixteen years ago (2, 7).

163 TEAM RESEARCH

The best results in research in library science, as in any other subject, will be got by team work. The members in the team for pragmatic research will be generally found scatteted as workers in different libraries. But concentration of the team will be helpful in *a priori* research. The concentration should be made at least periodically. Here is an example, In April 1925, I spent a few days with G H Hardy, Savilian Professor of Geometry in Oxford. He told me that he was spending many of the summer vacations with Edmund Landau and his colleagues in Leipzig. The reason he gave for this was revealing. He said that their working together as a team in one and the same place, at least for three months in a year, was necessary to carry the research work forward. Of course, there are permanent teams concentrated for research in several universities for some subjects. An *ad hoc* concentrated team for research in library science was formed for the first time by the Library Research Circle of Delhi in 1949. But this was an *ad hoc* improvised concentration. Such library research circles are now functioning in several countries. But a more closely bound continuing research team in library science was formed in India in 1962. This is the DRTC — the Documentation Research and Training Centre (Bangalore). The research output of the DRTC demonstrates the advantage of such a closely bound continuing research team. The wish is that the Schools of Library Science in all the universities should develop similar closely bound research teams.

164 CONTACT WITH GROWING MINDS

The experience in DRTC has shown that contact with growing minds is necessary to ensure freshness in approach. The teaching wing of DRTC provides this facility.

165 PERSONAL QUALITIES FOR RESEARCH

For research to be effective and persistent, the following personal qualities are necessary in the research worker:—

1 Aptitude and intellectual capacity for research;

2 Open-mindedness and capacity to participate with colleagues;

3 Industry and strong will to do;

4 Concentration of one's interest in the subject of research;

5 Spirit of dedication to the subject of research;

6 Capacity and willingness for wide study, as library service is essentially the distribution of intellectual commodity among all people and as the intellectual commodity distributed to specialists should be nascent ones; and

7 Personality with leadership, beneficial aptitude, and sound capacity for research, at least in one person in each research team.

166 WHAT SHOULD BE AVOIDED

The purpose of research is to find out something not known. Therefore, a research worker should not do his work with a view to establishing some pre-formed opinion of his own about the truth. This does not mean that he should not make a conjecture. If he does he should always be prepared to give it up or modify it, as the case may be, if research shows it to be wrong; he should not pet his conjecture and twist his research to prove it to be right even if it is wrong. A researcher should not develop partisan spirit. He should not start with the attitude, "My opponent upholds the result X. My function is therefore to destroy his position." Personal animosity should never be allowed to distort or even colour research work.

167 TRAINING IN RESEARCH METHOD

While an exceptional few may have an inborn grasp of research methods, the majority should be given a sound training. Mere theoretical training will not be of much use. A research student should learn research methods by actual doing under guidance. He should begin by looking up and collecting together for his leader all the references relevant to the work being done by the leader; it is not enough to collect merely the references suggested by the leader; but he should also seek to supplement them by additional findings of his own. He should avail himself of every possible opportunity to watch his leader struggling through

his problems, the turns he takes, the rebuffs he gets, the resilience he develops, the way in which he brings to bear on his problem all associated ideas immediate as well as remote, and the way in which he writes and rewrites to arrive at the final formulation of his results. He should also experience, through working with the leader, the inseparable way in which the process of thinking and the precise expression of the results of thinking are linked up. The Indian tradition about training for research clinches the importance of the research student thus living intimately with his leader, by the term used for denoting a research student. It is '*Ante-vasi*'; the literal meaning of this term is "one who lives in the immediate presence".

17 GENERAL ILLUSTRATION

My book *Five laws of library science* (1931; 1957) contains many simple illustrations of a general nature, showing the advantages of both *a priori* research and pragmatic research in library work. It also illustrates here and there all the five ultimate levels of research — pure, applied, observational, empirical and developmental — and also how they are blended. Illustrations are also scattered in several articles and books.

18 SPECIFIC AREAS FOR RESEARCH

I am sure that by now many librarians have begun to realise the scope for research — tiny or big — in improving their work. The remaining sections of this paper are devoted to some of the specific areas of research in Library Science.

2 CLASSIFICATION

20 SOURCES OF PROBLEMS FOR RESEARCH

The essential function of classification is to so organise the universe of subjects as to make the retrieval of any desired subject or any filiatory sequence of subjects pinpointed, exhaustive, and expeditious. The universe of subjects is multi-dimensional. But the documents embodying the subjects have to be arranged along a line — that is, in one dimension. This requires the arrangement of the subjects themselves along one dimension. In other words, the essence of classification is equivalent to the mapping of a multi-dimensional space along one dimension. The subjects in the universe have neighbourhood relations of various removes; and some of them have the same degree of immediate-neighoourhood relation to a given subject. The problem in the mapping, which classification is, amounts to determining which immediate neighbourhood relation should be kept Invariant; because when represented in one dimension, all but one of them cannot preserve that quality. This is a tangled problem. For

a long time, this was solved by classificationists with the aid of sheer flair. But the universe of subjects is ever dynamic and turbulent; and sooner or later, a stage is reached when the work done by flair gets outmoded. Therefore, a considerable amount of *a priori* research and pragmatic research is needed to arrive at a relatively stable set of Invariants. Further, developmental research also is continually needed.

21 Planes of Work

211 Mutual Inhibition

Further, a schedule for classification lies in reality in three planes — the idea, the notational and the verbal planes. The work in these three planes have not for long been separated out. The result has been the inhibition of the progress of work in one plane by the unsolved difficulties in another plane. For example, inhibition in the work of the Idea Plane by the defects in the Notational Plane occurs very often in Decimal Classification. Not only inhibition, but even wrong decisions in the Idea Plane caused by the Verbal Plane have been experienced quite often in Colon Classification.

22 Mood of Despair

Experience with almost-enumerative scheme for classification alone, such as Decimal Classification, and the absence of experience with a freely faceted classification, such as the current version of Colon Classification, is throwing the library profession into a mood of scepticism. Some in the library profession say, "No classification! Subject indexing will do"; some others say, "There must be a general classification for generalist libraries and a special classification for a specialist library in each subject"; still others say, "Have broad classification for shelf-arrangement and minute classification for catalogues and documentation lists." Such pronouncements are now based on personal opinions tinged with emotion and despair. But if research is done in library classification and judgement is based on the results of research, there is every probability for all such desperate suggestions becoming unnecessary. About a decade ago, it was discovered in India that to get useful results, research should be done in each of the three planes of work involved in classification (33). Once work was started independently in the three planes, it was found necessary and also possible to base the work in each plane on Canons, Postulates, and Principles of its own. Some Canons were formulated by W C Berwick Sayers early in this century (47); these were helpful in giving a descriptive interpretation of the few schemes for classification in vogue at that time; but they were not dynamic and did not lead to further thought on the design of

schemes for classification. About twenty years later, Henry Evelyn Bliss brought out his own set of canons (3). Some of these had a certain amount of dynamism. The Indian list of Canons published a decade later included more dynamic ones (37); thirty years later, an enlarged version of the same list added some more of dynamic Canons, postulates, and Principles (37).

23 Idea Plane

The work in the Idea Plane is now guided by 15 Canons (26), 13 Postulates and 4 Principles for Facet Sequence (28), and 18 Principles for helpful sequence in an array (29). Most of these aids for guidance are traditional and intellect-based, while a few, such as the Postulates and the Wall-Picture Principle, are intuition-based. As work proceeds on the design and application of schemes for classification, it may happen that these Canons, Postulates, and Principles prove inadequate. Pragmatic research should seize such occasions and add whatever is needed to remove the inadequacy.

24 Verbal Plane

The Verbal Plane is responsible for many confusions in classification — its design as well as its application. The mischief is eliminated to some extent by the four Canons enumerated in the *Prolegomena* (11). But this alone is not sufficient. There is need for the library profession to take active part in the promotion of homonym-free, synonym-free, standard glossary of technical terms for each subject-complex. Specialists in some subjects had themselves sensed the need for such standard glossary even during the nineteenth century. There are now International Committees for Nomenclature for a few subject fields. Since World War II, international and national Standards Bodies have also seized this problem. A considerable amount of pragmatic research can be done by the library profession as a contribution to the solutions of the problems.

25 Notational Plane

251 Role of Notational Plane

It is the Notational Plane that distinguishes library classification from classification as it is commonly understood. Each subject has to be represented by an ordinal number in order to mechanise the replacement in the correct place of any document taken out for use and to insert in the correct place any new document on an old subject or on a new subject. The Notational Plane should be strictly given the status of a servant to implement the findings of the Idea Plane. In the past, this had not always been the case. Very often, helpfulness in the enumeration of

subjects has been vitiated by the tyranny due to the incapacity of the Notational Plane; in other words, the tail had wagged the dog. The attitude of the Notational Plane should be the one illustrated by the following episode in the Indian epic *Ramayana*:

Rama, Sita, and Lakshmana are in exile in a forest near Nasik on the banks of the Godavari. Lakshmana assumes the role of a servant. Rama asks Lakshmana to find out a good site to put up a hut. Lakshmana politely says, "Choice of the site is a matter of judgement. It is solely within your jurisdiction. After you choose the site, my own work to put up the hut begins."

252 ROLE OF REMEMBRANCER

For long, the idea plane had been inhibited from thinking out its best, on account of the inadequacy of the notational plane. As a result of long continued inhibition, the idea plane may even stop short of the right decision. The Notational Plane may then assume the delicate role of remembrancer and tell the Idea Plane, "I only remind you, my Lord, I do not instruct you" using the exquisite words used by Sita to remind Rama.

For example, the use of different sectors in the Array of Order I and of the Superimposition Device are now being brought into use in the Notational Plane in Personality Facet. It yields co-extensive class numbers such as

"D9c3,ZF-Z7-Z4-9zM-9zC, Screw, Hexagonal head, Flat point, Metric thread, Fine pitch,"

It takes time for this versatility of the Notational Plane to be remembered and made use of by the Idea Plane, shaking of its tendency not to spread out its wings, under the pressure of the memory of the old incapacity of the Notational Plane inhibiting it in the past.

253 CANONS AND PRINCIPLES

Edition 3 of the *Prolegomena* gives 21 Canons (26) and 9 Devices (27) to regulate the design of the notational system of a scheme for classification. The Canons of Faceted Notation and of Seminal Mnemonics are intuition-based; and the other Canons and all the Devices are intellect-based. They are amenable to further addition through research, whenever they prove inadequate. For example, the Canon of Extrapolation in Chain was hit upon and implemented by the Decimal Fraction Notation nearly a century ago. But the Canon of Extrapolation in Array was hit upon and implemented by the Sector Device and Mixed Notation only about 30 years ago. The Canon of Interpolation in Array was hit upon and provided for only three years ago. In this connection, Colon classification found it necessary and sufficient to postulate the digits T, V, and X as Emptying Digits and the

digits z, 9, and Z as Empty Digits and the digits U, W, and Y as Empty and Emptying digits (32). The Canon of Interpolation in chain has just been formulated, but no method of implementing it has been found as yet.

254 CONNECTING DIGITS

To implement the Canon of Faceted Notation, Connecting Digits are necessary. As and when need arose, the number of Connecting Digits has been steadily increased. If these prove inadequate, some developmental research will be necessary to add further to the number of Connecting Digits. For example, the use of "=" (equal to) sign was brought into use only two years ago in the application of the Alphabetical Device to multinomial terms (6).

26 MODEL FOR CLASSIFICATION

An essential province for pure research in classification is the establishment of the different models for classification. Till now, five models have come into vogue. They are:

1 Purely Enumerative Model illustrated in Library of Congress Classification and Rider's International Classification;

2 Almost-Enumerative Model illustrated in Decimal Classification;

3 Almost-Faceted Classification illustrated in Universal Decimal Classification;

4 Rigidly Faceted Classification illustrated in the earlier versions of Colon Classification; and

5 Freely Faceted Classification illustrated in the current version of Colon Classification.

Even without waiting for all these models to get outmoded, it is open to pure research in classification to set up other possible models.

27 BUILDING OF SCHEDULES FOR CLASSIFICATION

The building of schedules for classification requires applied and observational research. The preliminary drafting of the schedules will involve applied research. They should be tested by observing how far the readers find them helpful; this is observational research.

271 REFINEMENT OF SCHEDULES

As the universe of subjects is dynamic, now and again it will be constantly throwing out new proliferations. To meet this phenomenon, continuous refinement of the schedules will be necessary. This is a matter for developmental research.

28 PROBLEMS FOR PURSUIT

Classification will always present new problems to be solved by research. Ed 3 of the *Prolegomena* enumerates them (35). It gives a list of

1 Twenty-one problems solved during recent years;
2 Six problems being solved now; and
3 Eight old problems not solved and twenty-three new problems that have arisen during the last ten years.

These problems belong to the idea plane, notational plane, and model construction respectively.

3 CATALOGUING

30 SOURCE OF PROBLEMS FOR RESEARCH

An essential function of a library catalogue is to present a list of entries for the documents in the collection, arranged in a helpful way. Experience has shown that a document usually requires several entries. Each entry has a heading. The source of information for the choice of the heading and for the other sections of an entry is the title-page and sometimes also some of the other preliminary pages of the document. Changes occur from time to time in the practice of the make-up and the contents of the title-page and of the other preliminary pages. Some of these changes call for continuing research in cataloguing. The headings for subject entries are not at present indicated adequately in the title-page or in the other preliminary pages. The whole book has to be taken as the source for this kind of entries. This is a tangled problem needing considerable research. The trend in our own generation of composite books being published raises new problems in cataloguing. They are being investigated; we have not yet arrived at a stable standard and simplification. Another source calling for research in cataloguing is the new reprograph methods coming into vogue. A whole book may be micrographed on a 125×75 mm card, or on a microfiche or in a microfilm. The difference in their physique raises some problems for research, in order that necessary help may be given in the part of the catalogue entry, usually called collation. A still another source for research in cataloguing is the practice of cataloguing each article in a periodical. A catalogue entry of an article requires additional information. The standard for this information has not yet been stabilised or simplified. This requires research. Most of these problems require pragmatic research. But a few admit of *a priori* research.

31 CANONS AND PRINCIPLES FOR CATALOGUING

Till about thirty years ago, cataloguing practice was an affair of rule of thumb or trial and error. Therefore, there was

considerable inconsistency and drifting along. But it will certainly be better to base framing of catalogue codes and the application of its rules on systematic research. Whether it is pragmatic research or *a priori* research, it is a help to base it on some accepted Canons and Principles. A set of these was supplied for the first time about 30 years ago by the Indian System of the Theory of Catalogue (19). These have been further added to and there are now seven Canons and two Principles in use today (15).

These Canons and Principles are in addition to the Fundamental Laws of Library Science and other laws of general application (14).

To give an example of the steady influence of the Canon of Ascertainability, the choice of the heading for the main entry of a document has been very uncertain for a long time. With the aid of this Canon, it has now been systematised and the choice of heading can be inferred from the title-page of the document in a consistent and reliable way (10).

32 Name-of-Person

One of the long standing and tangled problems in cataloguing is the Rendering of name-of-person in the heading of an entry. Usually a name-of-person is multi-worded. The distribution of potency (from the point of view of arrangement) of the words in the name is unequal. Further, the position of the most potent word in the name varies from cultural group to cultural group. In the same cultural group, there are also totally impotent removable attachments to the names-of-persons. The need for research in this problem was raised by India in 1938. At its Meeting held from 21 to 25 April 1952, the Unesco's Provisional International Committee on Bibliography and Documentation held in Paris, the investigation of this problem was assigned to India in so far as Asian names were concerned The final report of this investigation was despatched to Unesco on 31 October 1953. One year was spent by Unesco in getting opinions on the report from France, UK and USA. France gave general approval. The remarks of UK had no relevant substance in them. The remarks of USA dealt largely with the style and the terminology of the report, with a few substantial suggestions. But the report was never published, though there was demand for it. Therefore, this was considered by the Documentation Committee of the Indian Standards Institution and an Indian standard was arrived at (16). This project required both applied and observational research. A similar standard should be established on the basis of research by every other country.

33 NAME-OF-CORPORATE BODY

A second tangled problem is the Rendering of the name-of-corporate body in the heading of an entry. There are two divergent practices. The *Prussian instructions* does not recognise corporate authorship at all; however, in the Zagreb Meeting of the IFLA held in 1954, there was evidence of Germany being prepared to reconsider this matter. The name-of-corporate-body is often not only multi-worded, but it also has a succession of word-groups. Each of these is called a heading — first heading, second heading, etc. This factor raises three problems:

1 The choice of the different headings;

2 The sequence of these headings; and

3 The determination of the entry element in each heading, in the light of the Canon of Prepotence.

A considerable work is being done in India on this problem. In the case of the governmental author, the first heading has been standardised everywhere. There is difficulty only in regard to the later headings. In the case of an institutional author, the present practice of rendering even the first heading needs further research. Similar is the case with the name-of-a-conference. In all these cases, both pragmatic research and *a priori* research based on Canons and Principles will be necessary.

34 NAME-OF-SUBJECT

A third tangled problem in cataloguing is the choice as well as the Rendering of the name-of-a-subject for use as a subject heading. The determination of the subject of a document had been for long done entirely by the cataloguers, ignoring the fact that the classifiers have this work as their only speciality. In my address at the Whittal Pavilion of the Library of Congress in August 1948, I referred to the considerable wastage of man-power by the subject of a book being determined independently by two different squads of staff working in adjacent rooms. I also pointed out the high probability for inconsistency arising out of this duplication of effort (25). But pragmatic research made by India on the basis of Cutter's *Rules* and the Dictionaries of Subject Headings led India in 1938 to establish the Chain Procedure for inferring the name-of-a-subject of a document from the class number given to it by the classifier (45). The Chain Procedure laid down also tentative rules for the rendering of the name-of-a-subject in headings. Further research has shown that it is possible to frame these rules in alternate ways to produce any specified result (17). Some more research is necessary in this matter. There is also the danger of the appearance of homonyms

in the names of subject headings. This is due to the Language of the Subject Headings, though using the words of a natural language, being an artificial language having only words in the nominative case and the syntax being only that of position. Some work has been done in India during the last three years, which has led to the resolution of the homonyms in many cases with the aid of the Canon of Context (13). There are still some residual cases needing further research. Cross reference from a collateral link is also a problem requiring research.

35 NAME-OF-SERIES

A fourth tangled problem in cataloguing is the rendering of the name-of-series in the heading of an entry as well as in the note section of the main entry. Work done in India during the last 20 years has led to the recognition of some kinds of pseudo-series, apart from the normal publisher's series. There is again the case of a book belonging to two or more series. There are many residual problems in this area needing research. It will be partly canon-based and applied and partly pragmatic and observation-based.

36 PERIODICAL PUBLICATION

The periodical publications have raised a host of problems in cataloguing. These publications consist of several volumes published successively for a long period of years. This long and indefinite life of a periodical publication exposes it to many ills. Work done in India thirty years ago led to these ills being divided into six groups of complexities. On account of these complexities, the rendering of the name of a periodical publication in the heading is beset with difficulties. The content of the sections other than the heading of the main entry have also to be rendered differently for different kinds of complexities. These later sections present some additional problems in the case of the indexing and abstracting periodicals. Research in India has arrived at some standard on this subject (34). The research involved is both applied and pragmatic. There are, however, many residual problems left over for further investigation.

37 CONFERENCE PERIODICALS

The periodical reports of a long continuing conference present some problems over and above those presented by ordinary periodical publications. These problems are now being investigated in DRTC, Bangalore. The results will appear in a forthcoming book (12) in the form of amendements to the rules of the *Classified catalogue code*.

38 LIST OF PROBLEMS FOR PURSUIT

The problems in cataloguing awaiting investigation are being listed and the list will form Part P of the forthcoming book *Cataloguing practice.*

4 BOOK SELECTION

40 SOURCES OF PROBLEMS FOR RESEARCH

Social and political pressure increases the number of readers to be served by a library; this will go on increasing until the entire population begins to use the libraries. Publication pressure is created by the need to produce books, not only on conventional and largely intellectual subjects of old, but also on all kinds of arts and crafts — down, for example, to the subject of screws, expounding details, such as their varieties to suit different purposes, the most economical materials to be used in making them, simplified methods of manufacturing them, protecting them from corrosion by atmospheric, water, and other environmental causes, and determining the duration of their life. Finance produces another pressure on book-selection; the pressure is caused by its being limited and always inadequate.

41 PRINCIPLES FOR BOOK SELECTION

The factors mentioned above disable any library — even the richest library — from acquiring all the publications of the world. On the other hand, many will have to be rejected and only a few can be selected. In the past, the principles for book selection were largely arrived at by pragmatic methods; a book on the subject published in USA illustrates the use of this method (41). It is also possible to arrive at the principles of book selection through *a priori* method based on the Five Laws of Library Science; a book on the subject published in India illustrates not only this but also the way in which *a priori*, pragmatic, and developmental research should be blended to arrive at an adequate number of sound principles (23). These principles cannot be taken to be static. As changes occur in social pressure, publication pressure, and financial pressure, research will have to be done in book selection to amend and add to the principles.

42 SUBJECT-BASED CO-ORDINATION

As things stand today, the opposing implications of the Second and the Third Laws of Library Science and the financial pressure call for co-ordination of book-selection among all the libraries of a country. One form of co-ordination and sharing responsibility is subject-based. The first well-known attempt at this was the Farmington Plan of USA (51). The distribution

of the subjects among the libraries of a country requires developmental research from time to time.

43 LANGUAGE-BASED CO-ORDINATION

There is not much probability for the documents in all the language of the world to be in demand in every library. Therefore, language-based co-ordination is also necessary in book selection. The choice of the languages to be represented and their distribution among the libraries of a country require pragmatic research. This will have to be repeated from time to time.

44 DOCUMENT-BASED CO-ORDINATION

Experience has shown that co-ordination in book-selection should be different for documents of different kinds — such as conventional books, periodicals, serials, newspapers, and non-conventional documents of all kinds. This problem requires research from time to time.

45 INTERNATIONAL CO-ORDINATION

But for the instability of international relation and the risks likely to be caused by such instability, co-ordination in book selection may well be made among the libraries of all the countries of the world. When the time comes for it, and even now for regional co-ordination — or at least for co-ordination among the countries with promise for continued good relation, such as the countries of the Commonwealth — research should be the basis for arriving at guiding principles for co-ordination in book selection.

46 COST-BASED CO-ORDINATION

Another principle used in the co-ordination of book selection has been the cost of a publication. Stocking of books beyond a certain cost, and not in frequent demand, may be left to the care of certain national or regional central libraries in a country. Determination of the limit of the cost of books in this practice will have to be found out and changed from time to time by applied and developmental research, in the light of the changes in the value of money.

47 PRINCIPLES FOR EXCHANGE AND INTER-LIBRARY LOAN

Any co-ordination of book selection among the libraries of a country should be coupled with inter-library loan and permanent exchange of documents. The principles to guide these should be established by blending applied and pragmatic research. The application of these principles will require developmental research from time to time.

48 PRINCIPLES FOR WITHDRAWAL OF BOOKS

As physical commodities books are frail and not all of them are durable, Therefore, books are sure to be worn out by use, if the Five Laws of Library Science are in full operation. This necessitates periodical withdrawal of books from a library. Withdrawal may be necessary also for other reasons. But the withdrawal among all the libraries of a country should be co-ordinated by a national agency, such as the National Central Library, in order to avoid the risk of a country being left without even a single representative copy of some book or other. The principles for co-ordinated withdrawal of books are yet to be formulated. Their formulation may need research.

5 REFERENCE SERVICE

50 SOURCE OF PROBLEMS FOR RESEARCH

The main source calling for research in reference service is the largeness of the number of readers, as well as of the number of documents. Further, the psychological types and the varied intellectual standards of the readers on the one hand, and the varied standards and style of books and hide-and-seek of the documents on the other, require a considerable skill in matching the right reader with the right document. This is now being left largely to the native ability of the reference librarian. Of late, they are also given some training through both theoretical lessons and clinical instruction on the floor of the stack room. But what is taught as theory is in its turn left to the flair of the teachers or of the authors of books on reference service.

51 NEED FOR RESEARCH

The magnitude of this problem on account of both the large numbers involved and also the formation of specialist libraries and the establishment of documentation service to specialist readers, the time has come to base the guiding principles of reference service on systematic research. This research should certainly be of the blended variety. It should blend all the five kinds of research mentioned in Sec 07 of this paper.

52 REFERENCE BOOKS

Reference service is often handicapped by the absence of ready reference books. The subjects in which reference books are inadequate cannot be sensed *ex cathedra*. These subjects and the kinds of reference books to be produced should be determined by observational research. The most competent persons for this research are the reference librarians. Here is a case where the essential research room should normally be the work room of the reference librarian — *viz*, the stack room.

53 CENTRALISED DOCUMENTATION WORK

Apart from reference books, reference service often involves far too much time and even fails to give full satisfaction because of the absence of indexing and abstracting periodicals. These are best produced centrally for each country on national and to some extent on international basis. It is only observational research by reference librarians that can spot out thoroughly all the subjects in which such reference aids should be produced. It is again this observational research that can determine the most helpful way of producing these reference aids — either as one monolithic documentation list for all subjects or as different documentation lists for different subject-fields — and can determine the mode of arranging the entries so as to give maximum help to reference service.

6 CIRCULATION WORK

60 SOURCES OF PROBLEMS FOR RESEARCH

It is the large number of readers that has made research necessary in the apparatus for circulation work.

61 WORK ALREADY DONE

This cause became operative in UK, for example, even about a century ago. Before that, circulation work was controlled by ledgers in bound-book form. But when the number of readers began to increase, this method broke down. Therefore, under the drive of the Fourth and the Fifth Laws of Library Science — unconscious though this drive might have been — some librarians began to do some pragmatic research. One of the first results of this was the Indicator System. Then came the apparatus consisting of one card for each book, showing the history of its successive issues, and one card for each reader showing the successive books borrowed by him. Further research introduced the "Book card in Reader's Ticket" system. In this, each book had a book-card in the form of a plain card, with no more entry on it except marks of identity of the book; and each reader has as many tickets in the form of a pocket, as the number of volumes he could take out on loan at one time. Further research stimulated by the Fourth Law of Library Science showed the advantage of making the book-card in the form of a pocket and the reader's ticket in the form of a plain card without a pocket (38).

62 NEED OF SPECIALIST LIBRARY

The issue system described above is not found to be sufficiently helpful in a specialist library where the number of volumes that a reader can take out at a time is unlimited and the period

of loan also is unlimited. This calls for research. Some work on this has already been done (1).

63 Sociological Research

The statistics of issue can lead to some research of sociological and cultural value, if they are collected under appropriate heads. The books read form a good index of the cultural state of a community and its vocational trends. For this purpose, the design of the statistical counting sheets requires research. Something of this was attempted in the Madras University Library about forty years ago. Further research on this matter will yield valuable results.

7 ORGANISATION

70 Sources of Problems for Research

Once again, the combination of the increasing number of documents used and the inadequacy of finance creates problems for research in library organisation. Research for this stems more or less from the Fundamental Laws of Library Science.

71 National Public Library System

To provide books for all at the least cost, the public libraries of a country should be knit together into a national library system. Viability and efficiency of service call for a national library system to consist of sub-systems made of several city library systems and rural library systems. The viability of these systems will change from time to time according to the value of money and the changes in the pattern of public finance. Fixing the viable units for each of the sub-systems will require continuing research. Further, the number of such sub-systems will have to be determined by empirical research based on the number of population clusters and other census data. Perhaps it will be necessary to re-examine this once in ten years after the results of the decinnial census are known. There are cases in which as a result of pragmatic research, some city library system or other had to be abandoned and merged into the rural library system. It has also happened that some town library belonging to a rural library system had to be converted into a city library system. The movement of population is another controlling factor. Some ten years ago, the distribution of the concentration of the communities on which the Toronto Public Library System had been originally planned was found to have appreciably changed. This required replanning of the public library system. The Library Authorities wisely engaged a library consultant to do some research on the problem and give a proper advice.

72 OTHER WINGS OF NATIONAL LIBRARY SYSTEM

A national library system will consist, not only of public library system, but also of academic library system and specialist library system. The academic library system will consist of several sub-systems belonging to different levels such as school, college, university, and other kinds of research organisations. All of these will not lend themselves to be treated as a single system. Again, the specialist library system cannot be regarded as a single system. There should be a separate system for each industry-complex; it will also be useful to have a separate system of government departmental libraries. To organise all these library systems rationally and economically, both *a priori* and pragmatic research will be necessary.

73 FINANCE FOR PUBLIC LIBRARY SYSTEM

An important problem needing research in Library Science concerns library finance. The financing of the public library system is a complicated problem. The tendency has been to divide the responsibility for the provision for library finance among Local Bodies, Governments of the Constituent States, and the Federal or the Union Government. This has been done till now largely through flair. Surely, much can be gained if this is based on systematic research. This research should take into consideration the tax-pattern of the country. The tax-pattern changes from time to time. Therefore, research on the sources for public library finance should be done periodically. This problem will need a different kind of situation in a communistic country.

74 FINANCE FOR ACADEMIC LIBRARY SYSTEM

The finance for the different academic library systems is now largely determined by flair, or very often by the opinion of one or two persons of influence. This is not rational. The sources for the finance of the academic library systems should also be based on research. This will have to be *a priori* as well as pragmatic research.

75 FINANCE FOR SPECIALIST LIBRARY SYSTEM

At present, the finance for each industrial library is largely left to the care of its parent organisation itself. This involves a considerable waste due to the duplication of unfrequently wanted documents in several libraries of the same industry-complex. National economy would require that some financial arrangement should be found by research to eliminate this wastage. Again, the intermediate-size industries and small industries are being developed all through the country. At present they go without

any library service at all. None of these concerns will have the necessary finance to maintain a library of its own. Some work should be done on this to organise and finance the libraries for them on regional basis. In each region, they may collectively maintain a library of their own or the responsibility for library service to them may be entrusted to the public library or the academic library or the specialist library in the region, or to all of them, or to any combination of them. The results of leaving this problem to flair will be uneconomical. Research alone can produce the most efficient result. This research will have to be largely observational and empirical.

8 ADMINISTRATION

80 Sources of Problems for Research

So long as a library was a small institution with a small number of reading materials, with a small annual intake of them, and with a small number of scholar-readers, the organisation of its administration was left to the native flair of the librarian. But this has now been made insufficient by the all-round increase in all the elements constituting a library — reading materials, housing, readers, staff, and finance. Similar has been the experience in the case of the industries. It still continues to be so in the case of governmental administration. The managerial problem now arising is similar in all these cases.

81 Beginnings of Research

It is only about fifty years ago that it was realised that efficient management or administration is best based on research. This idea took shape for the first time in 1911 (50). Since then, research work is being done systematically in the field of industrial management and administration. Some research on library administration was done in India in the 1930's (21). This was both *a priori* and pragmatic. But it was only of the nature of a pilot project. It must be done on a larger scale and more systematically on a full-time basis. One of the items — work flow in a library — was discussed ten years ago by a Seminar on the subject organised by the University Grants Commission of India (48). The discussion in this Seminar also was based only on the experience of a few of the participants and largely on opinions and conjectures.

82 Areas for Research

All the areas for research in industrial administration occur also in library administration. Budget and budgetary control, cost accounting, and cost control are as important in library administra-

tion as in any industrial administration. But this has been often overlooked because most of the libraries draw their finance from public funds; this should not be allowed to continue. Plant engineering and particularly the lay-out problem are not absent in library administration. Personnel management, job analysis, and wage structure require a considerable amount of research. Some work on filing and job analysis in library work has been done as part of the pilot project in the Madras University Library mentioned in Sec 81. About 1,000 jobs have been isolated (22, 31). Systematic empirical research is necessary to place all these on a firm basis. There is again the problem of the organisation of the staff and its relation to top management. But generally speaking, it is still left to the idiosyncrasies of one or two in the top management. This should not be allowed to continue. Some work has been done in India on the organisation of the staff of a library. A staff formula has also been evolved (42). This formula has been based on empirical experience gained in the working of a few libraries and in the Madras University Library in particular. It is desirable that it is based upon objective man-minute analysis for each job. Again, the faulty relation between the library staff and the top management is often nullifying the public purpose of a library. Some division of functions between them was worked out in 1962 at the Seminar on Public Libraries convened at Hyderabad by the Andhra Pradesh Government (46). All these and many other similar problems should be regulated on the basis of systematic research.

9 FRINGE SUBJECTS FOR RESEARCH

90 Research in Co-operation with Specialists in Other Subjects

Research in each of the seven areas mentioned in Sec 2 to 8 of this paper falls entirely within the province of the library profession. But there are other subjects overlapping library science to some extent or of indirect interest to the library profession. These may be called fringe areas. The library profession will have to play some part or other in research in these areas. These areas are mentioned in the succeeding sections. It is found that the Five Laws of Library Science give their stimulus to research in these areas too.

91 Universe of Subjects: Its Development and Structure

910 Source of Problems for Research

In Library service, the consumer is the reader; the commodity served is systematised knowledge — that is, subject; and the distributor of this commodity is the library profession. To

do this work efficiently, the library profession should acquire some knowledge of the commodities to be served — that is, the universe of subjects, particularly its development, structure, and the inter-relation among the subjects.

911 FIRST FORMULATION OF THE SUBJECT IN 1947

This subject was thought of as a discipline by itself for the first time in 1947, while designing the syllabus for the Master's Degree Course in Library Science in the University of Delhi. The modes of development and the qualities of the structure of the universe of subjects were examined for the first time from the angle of the library profession while teaching the subject. This examination had to be based, among other things, on the history of subjects — not merely chronicle-history, but also evolutionary history and the history of the social forces shaping the latter.

912 PRIMARY RESEARCH

Obviously, this area is too vast for the library profession to take the sole responsibility for research in it. It is wise for the profession to depend upon the historical research being done by specialists in the respective subjects. Almost at the same time as this subject was thought of for inclusion in the advanced course in library science, history of science and philosophy of science were themselves taken up and pursued as a discipline in some of the universities in other countries (8).

913 FOLLOW-UP RESEARCH BY LIBRARY PROFESSION

In respect of research in the area of "Universe of Subjects: Its development and structure", the wise course for the library profession is to take over from the point at which historians and philosophers leave it and strike out its own line of research therefrom, so as to suit its own purpose as a sound foundation for the development of library classification in particular and library science in general.

914 FOUR MODES OF FORMATION OF SUBJECTS

One of the first results in the Indian System of the Theory of Classification was the recognition of the increasing dynamism of the universe of subjects and of its trend towards becoming a continuum. One of the first fruits of research in the subject was the isolation of the concepts of Basic Subjects, Isolates, and the four modes of formation of subjects, denoted by the terms, Dissection, Denudation, Lamination, and Loose-Assemblage. All these modes require further research.

915 INTRA-FACET LAMINATION

Another result got is the possibility of the lamination of two or more isolates taken from one and the same schedule of isolates. Before the term 'Lamination' was coined, and extended in meaning, this phenomenon was successively named Auto-Bias and Superimposition. The qualifier to be used in order to distinguish between lamination of isolates taken from different schedules and of isolates taken from one and the same schedule has not yet been finalised.

916 FUSION AS A NEW MODE OF FORMATION OF BASIC SUBJECTS

Fusion is just now being thought of as a fifth mode of formation of subjects. This mode has yet to be studied. Surely, other problems in the universe of subjects needing research will turn up every now and then.

92 STANDARD, LANGUAGE, AND STYLE OF WORKS

920 SOURCES OF PROBLEMS FOR RESEARCH

Under the drive of the Five Laws of Library Science, all persons have to be served with books and periodicals — from the topmost in the intellectual scale down to the very last. One result of it is a full-fledged scatter among the subjects to be covered by books and periodicals; there should be books and periodicals not only in the traditional high-brow subjects, but also in all kinds of arts and crafts, as already stated in Sec 40 of this paper; but books and periodicals do not exist today in all such subjects, usually considered as trivial by authors and scholars bound by tradition. Again, the language used for the books intended for the lower quartiles in the intellectual scale should be simple, free from pedantic words, and not inolving long and complex sentences. The extent of the need for it requires investigation. Similarly, the style of the books for the lower quartiles in the intellectual scale should be absolutely transparent. No doubt, in a language such as English there has been an all-round trend down towards simple style from the beginning of this century. But in a language such as Tamil now being revived after a few generations of exhaustion, this does not happen. On the other hand, the tendency is in the reverse direction. There is a trend among writers to use medieval and even archaic Tamil both in the words used and in the style adopted. This is being done as a result of certain political and social factors. But that the Tamil language is sufficiently supple for expression of thought in a simple, transparent style, with short sentences to express any idea whatever, has been demonstrated by the contemporary poets and writers of the first order, such as Subramania Bharati and Mahamahopadhyaya Dr U V Swaminatha Ayyar. Such a simple language and style

are also being developed by some of the weekly magazines in Tamil. But these are mostly by non-university men. These do not appear to get the sympathy of the new university-trained generation, beginning to use Tamil as the medium. They forget the needs of the man in the lower intellectual quartiles. A similar thing is probably happening in all the other languages which are recovering today after a long spell of exhaustion. But the reference librarian, doing floor duty in the stack room, feels the difficulty, even as the toad under the harrow knows where the pinpoint goes. This is another source of problems for research in authorial art.

921 ROLE OF THE LIBRARY PROFESSION

Writing books and articles for periodicals on all conceivable subjects is not the function of the library profession. Therefore, it cannot by itself make any research in the art of writing. Its role is largely confined to bring home to the would-be writers the need for books and articles being written in a language that will be meaningful and will not be obstructive to the persons in the lower quartiles in the intellectual scale. A mere statement of this fact will not carry conviction. The statement should be supported by statistical data obtained by observational research on the floor of the stack room. The librarian, who has the opportunity to see the reaction of the readers to the reading materials is a fit person to make such research. He should be further helped, if necessary, by statisticians to design the experiment for his observation and also to study the statistical data so collected and bring out the results that will be convincing and useful to the world of writers.

922 ROLE OF THE PROFESSION OF WRITERS

At this point, the writing profession should take over and make its own investigations as to how best reading materials can be produced of the right standard, of simple language, and of transparent style. All along, the term 'writer' has been used deliberately in the place of the term 'author'. It is to emphasise the fact that a born author's work is a work of art. It is beyond all rules and regulations and beyond all research. It has to draw from intuition. Generally speaking, intuition reveals the right way. But such born authors are not found sufficient to meet the needs of book-production today. It is therefore necessary to draw into the business the intellectual writers also. These writers are not guided heavily by intuition. Their work is amenable to research and to guidance by some standard. Some attempt like this was made by the Indian Adult Education Association about 15 years ago (40). The intellectual writers should be helped by

the librarians. For, it is the library, where the lower intellectuals use the books, that can function as a testing station for the writers. In this testing work, the library profession will have to co-operate with the writers in the research they do. Probably, psychologists too should be associated in this testing stage of research.

923 NEW KINDS OF BOOKS

The sweep of the Second Law of Library Science does not omit even the bottom centiles in the intellectual scale. It is so democratic as to insist upon books of the right kind being served even to them. But this had been all along lost sight of. This has been largely due to the librarians themselves belonging to a higher point in the intellectual scale—probably to the first or the second quartile. They did not, therefore, realise their duty to the unfortunate few at the bottom of the intellectual scale. For the first time, I hit upon this neglected spot in library service in an address to librarians about 15 years ago at the Chaucer House, London. At the end of the lecture, one of my friends told me that an old librarian who had occupied the chair was very sceptical about the value of the suggestion. That shows the conservatism in man and the difficulty of developing sympathy for those below, either in the intellectual ability, or economic competence, or social status. At that time, I suggested that the librarians, writers, and psychologists should do pragmatic research to determine the qualities which the books for the lowest in the intellectual scale should have. I suggested that ideas could not be picked up by such readers merely from the conventional alphabet. They should be given books with plenty of telling illustrations which will enable the eyes to pick up the ideas simultaneously in the mind picking them up from the written words. It will be a further help if the book contains also sound-records of its words and sentences in a pocket at the end of the book; this will enable the readers of poor intellectual ability to pick up the ideas simultaneously through the ears also. In fact, I said the picking up of ideas should be simultaneously reinforced with the aid of all these means. This was elaborated later for the benefit of the Indian Adult Education Association (30). Though I have not seen it, I hear that the three-channelled books of this kind are produced occasionally in some countries. This subject requires a considerable research both *a priori* and pragmatic.

93 PRESENTATION OF THE TEXT

930 SOURCES OF PROBLEMS FOR RESEARCH

For maintaining productivity at the proper level every industry has to depend upon the use of published documents. The documents may describe know-hows; they may expound

trend reports; or they may be annual reports of particular concerns. Even the biggest industry in any country — the government — has to depend on such feeding of current thought expressed in documents, to improve its efficiency. The workers in industry and government offices are busy people. They do not take up documents for recreative reading. They use them for getting information. The more pinpointed the information is, the better it will be for them. They will also be helped if the various items of information occur in a standard sequence in all such technical books and reports. This is not happening today. This requires research.

931 ROLE OF THE LIBRARY PROFESSION

It is the specialist librarian feeding such specialist readers that feels the awkwardness of either himself or the reader having to fumble through a succession of such books from which a particular piece of information or idea has to be picked up. The specialist reader may feel the annoyance of being driven from one section in a book on to an altogether different section in other documents on the same subject, which he had to consult at one time. But the annoyance fizzles out at the very moment with the mere fretting and fuming of the specialist reader. It is the function of the specialist librarian, who witnesses this phenomenon with reader after reader and day after day and who is perhaps made to be the immediate but of the fretting of the specialist reader, to collect together all such experiences. It is the library profession that should cumulate all such experiences so as to bring out the faults in the presentation of the text of the document —be it a book or an article in a periodical. It is again the function of the library profession to bring the findings of its pragmatic research in the matter to the notice of the writers of such documents. This has been attempted in India (43). The problem has also been brought up for consideration by the Documentation Section of the Indian Standards Institution. In fact, the draft standard on the subject is at the final stage of consideration after wide circulation. Already we are getting several enquiries from the industries for advice on this problem and as to when copies of the standard will be available. It is hoped that the Indian Standards Institution will publish the standard at a very early date.

932 COLLABORATION WITH THE OTHER PROFESSIONS

In arriving at the standard, the library profession contributed its own share in the sequence in which the ideas in the text should be developed. In this, quite unexpectedly, the profession found it possible to draw much help from the Canons of Classification established in the country. But the standard could not be

arrived at by the library profession itself. It therefore sought the collaboration of the writers, the printers, and the consumers of such documents. I remember that the respresentative of the printers had to make some experimental research to make his contribution to the standard really useful. The representatives of the writers too willingly agreed to produce documents according to the standard; and the representatives of the business houses agreed to have documents produced according to the standard, tested in their respective concerns.

94 PHYSIQUE OF THE BOOK

940 SOURCES OF PROBLEMS FOR RESEARCH

A book is subjected to a much greater wear and tear in a library by its being handled and used more frequently than in a private collection. It is this which leads one to realise fully how frail the physique of the book has to be, as technology goes today, to make a book light and easy to handle. This naturally suggests that research should be promoted on the subject. Again the type-size, the proportion of white and black in open double page, the colour-effect of a printed page, the quality of the illustrations, and their relation to the varying capacity of the eyes of readers of different age groups, and all such matters concerning the subtle body of the book had not received attention until a variety of readers began to use the library. Now there is evidence that there is a considerable room for research in this matter. Binding is another physical feature of the book needing research.

941 ROLE OF THE LIBRARY PROFESSION

In all these matters, the role of the library profession has to begin with the gathering together of the empirical experiences with readers. It has then to pass on these experiences to the other professions, such as those of paper-making, type-casting, and printing, for research and improvement. The library profession will have to come again to co-operate with these professions and allow the library to be used at the testing stage of their research. Work of this kind has not yet progressed very far, though there are a few books bringing up the problems on this subject (39). With regard to binding, about fifty years ago, D Cockerell, the Master Binder of UK, realised that publisher's case was not adequate for library books. As a result of frequent handling of the book, it gives way very soon and thereby the paper gets damaged. Therefore, he designed reinforced library binding (5). But the necessary co-operation has not yet come between the library profession and the binders in this matter. I remember an experience in this connection. Kildall, the Inspector of Libraries of Norway, had arranged for co-operative purchase of

books for most of the libraries of the State and giving them reinforced library binding before distribution to the libraries. When I visited the bindery of this Inspectorate in 1948, I found hundreds of copies of each of several books piled in different heaps and a number of girls peeling off the publishers' case. "Why this wastage?" I asked. The reply was, "The publishers refuse to co-operate with the Inspectorate and supply the books in sheets." Such a non-co-operation between the libraries and the publishing houses is not good for national economy. Apart from this, binding requires continuing research. This is made necessary by the invention of new covering materials, new adhesives, and so on. Research is also necessary to match the strength of the binding with the strength of the paper, the weight of the volume, and the frequency of its use.

95 Methods of Reading and Study

950 sources of problems for research

Reading is an artificial activity. It is more artificial than many other activities of man. The correct way of reading and study has therefore to be acquired. The development of the habit needs special attention today on account of people lower down in the intellectual scale having begun to read and study and of the large number of books available for reading and study. When the books were few and only scholars with a highly integrated personality read, it was possible for a reader to use his own native discrimination in determining the correct way of reading and study. It is not so now. Further, in those simpler times, it was possible for a scholar to retain in his inner memory whatever was found in a book worth retaining. But today the inner memory is not sufficient. Each reader has also to develop an externalised memory; in other words, he has to learn the art of taking down notes.

951 role of the library profession

Research in the correct methods of reading and study and of taking down notes cannot lie solely within the province of the library profession. This work has to be shared with the teaching profession and the profession of psychologists. Perhaps research in notes-taking will fall more to the share of the library profession. Notes-taking can vary from the simple act of noting down the title read to the extent of extracting several passages from the book. To make the externalised memory of the notes taken fit for easy recall, it is necessary to maintain a diary of each book read, showing the title, the institution where it was found, and the date on which it was read. To decide the extent of extract to be made from each book is not an easy problem. There is

again the physical form in which the notes should be kept. Should it be in the form of a bound-book, or of a loose leaf book with find-me-out tags, or in the form of standard card or slip ? Again, should the entries in the diary be chronological, or classified according to topics? All these are problems which are now left entirely to the flair of the reader himself; and the majority of readers do not at all pay any attention to it. In fact, they do not even maintain notes. Hardly any research has been done in these matters as yet. The library profession should initiate the research.

96 Library Housing

960 Sources of problems for research

Research in the design of library buildings is emphasised by Law 5 of Library Science. According to this Law, a library is a growing organism. Further, in so far as the growth in the library building is concerned, the Law recognises two kinds of growth: one of this may be called child-growth — that is, a never-ending growth in size; and the other may be called adult-growth that is, growth not in size, but is only by replacement of worn-out books. Child-growth will always persist in the case of a national central library which is to be a copyright library as well as a storage library for the country. But in the case of a building for a service library, the child-growth will end and adult-growth will begin after some time. This means that the design of the building for a national central library will have to be quite different from that of the building for a service library. There is again the problem of fittings and furniture. Their dimensions should correspond with the anthropometric measurements. As the Laws of Library Science would bring all sorts of people into the library, the dimensions of the chairs, tables, and book shelves cannot all be the same. They should be of different dimensions. The standard deviation of these dimensions is likely to be considerable. A neglected region is the determination of the free space to be left around a reader in the reading room to satisfy the needs of his psyche. There is again the problem of lighting, colour of the reflecting surfaces in a library, and so on (49).

961 Role of the library profession

Research in all these problems is of vital importance to the library profession. But its function will end with the bringing of these problems for investigation by other professions. This was done in a series of conferences in USA about 20 years ago. In India too, the Library Buildings Committee of the Indian Standards Institution brought together the experiences in different libraries, in order to establish standards in these matters. But the standards so established were only provisional. In one of

the conventions of the Indian Standards Institution, the need for re-examining the standards and designing them on the results of specific research was emphasised (24).

97 Audit of the Efficiency of Library Service

970 Sources of problems for research

Libraries are now increasing in number. A considerable sum of money is being sunk in books, periodicals, other reading materials, and the buildings, fittings and furniture, to house them. A considerable sum of money is also spent on the staff to get the reading materials used as widely as the Laws of Library Science would require. But the efficiency or otherwise of library service cannot be determined easily. It requires research.

971 Role of the library profession

This research cannot be done entirely by the library profession itself. The technique, needed for audit of the efficiency of a library system, is essentially that used in sociological research such as opinion-survey. This technique is a delicate one as it will have to be applied with the least disturbance to the natural behaviour of the reader. Some work of this kind was done during recent years in USA (2, 7). In our country, there are not sufficient men trained in this technique of observational and empirical research. As stated already, the library profession cannot afford to take over these techniques. This problem requires attention in India as well as in many other countries today.

98 Absolute Syntax

980 Sources of problems for research

As stated in Sec 910, the Universe of Subjects is an ever-growing one, tending towards a dynamic continuum. The most helpful sepuence of subjects in a library is the problem of classification. For a long time, the sequence of subjects had been left to flair. In those conditions, myriads of different arrangements were upheld as equally helpful; all these were done on the basis of opinion. But the proper co urse is to base it on research.

981 Work done in India

As shown in Paper R, a considerable amount of *a priori* research, coupled with some pragmatic research, has been done in India. *A priori* research had been based upon certain Postulates and Principles. One of the important principles is the Wall-Picture Principle to determine a helpful sequence among the facets of a compound subject.

982 MARYLAND SEMINAR

In June 1966, Jean M Perrault arranged for a seminar on the Relational Factors in Classification. He invited me to deliver the valedictory address of the seminar. While preparing for it, an important problem for research suggested itself. It was the Concept of the Syntax of Ideas — the basic and the isolate ideas constituting a compound subject — controlling the sequence of the terms in the name denoting a compound subject. This syntax of ideas as determined by the Wall-Picture Principle is not preserved in the Linguistic Syntax of many languages, though it is in some. But so far as observation on the floor of the stack room goes, it looks as if this syntax of ideas gives the satisfaction to a majority of readers irrespective of the linguistic syntax of their mother-tongue, to which they had been accustomed all along.

983 NEW PROBLEM FOR RESEARCH

This pragmatic experience suggested the Concept of Absolute Syntax as a problem for research. It was conjectured that the syntax of ideas given by the Wall-Picture Principle perhaps corresponded to absolute syntax. An appeal was, therefore, made for this problem to be investigated. The investigation of this problem should be done co-operatively by a team of linguists, psychologists, classificationists, reference librarians, and statisticians (20).

991 CONCLUSION

A blue print of 15 broad areas has been outlined in this paper as worthy of research in the field of library science. Further details of each one of these areas should be worked out. The two succeeding papers deal with some details of the two areas "Universe of Subjects" and "Classification". Two more papers on the details of a single plot in Classification and two more on the details of the areas for research in Cataloguing and Book Selection will be published in the 1968 issues of this quarterly. Similar papers, working out the details of the other areas for research, are solicited for publication in the later issues.

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3 Column 2 of this bibliography gives the number of the Section in the text, where the reference to the document is made.

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